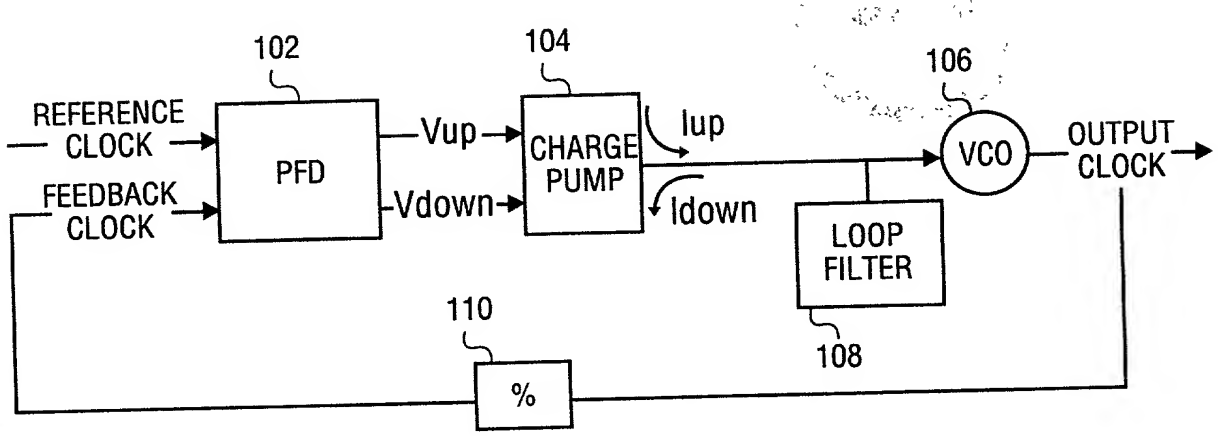

102
104
106
REFERENCE CLOCK
FEEDBACK CLOCK
PFD
Vup
Vdown
CHARGE PUMP
Iup
Idown
VCO
OUTPUT CLOCK
LOOP FILTER
108
110
%

FIG. 1A

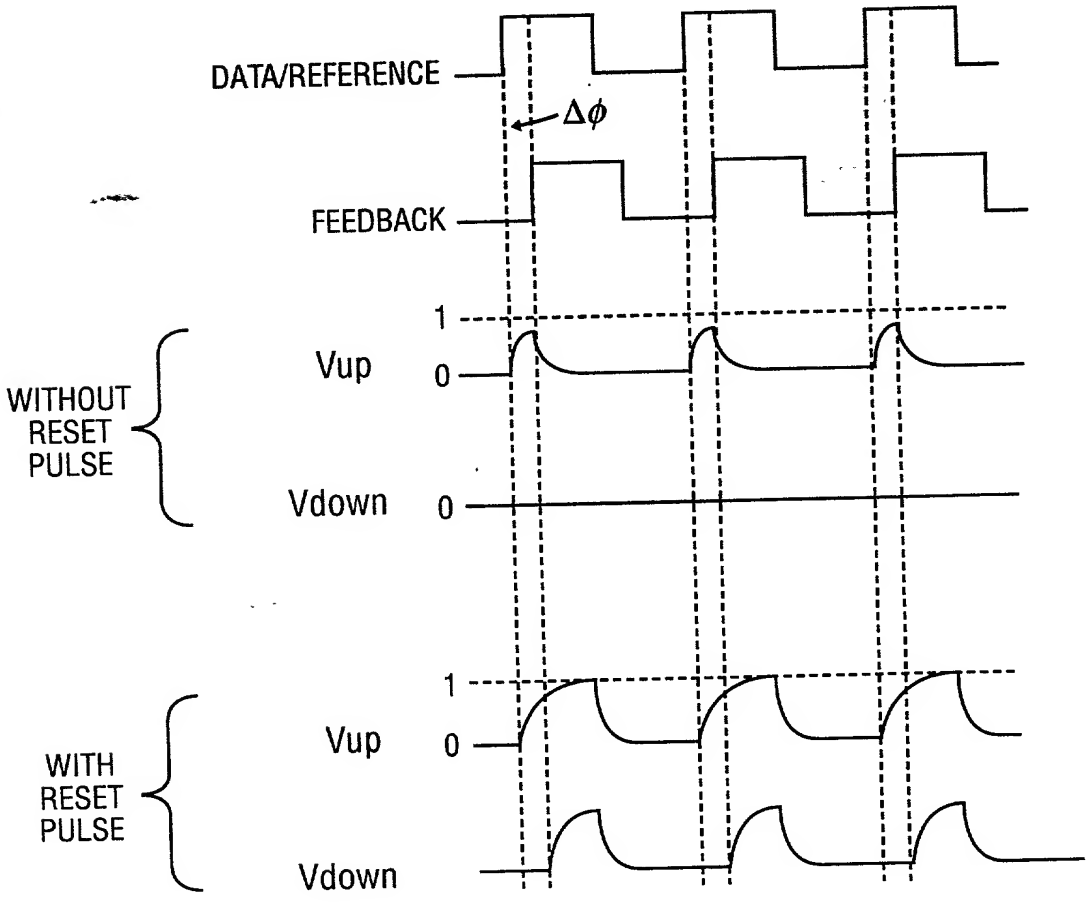
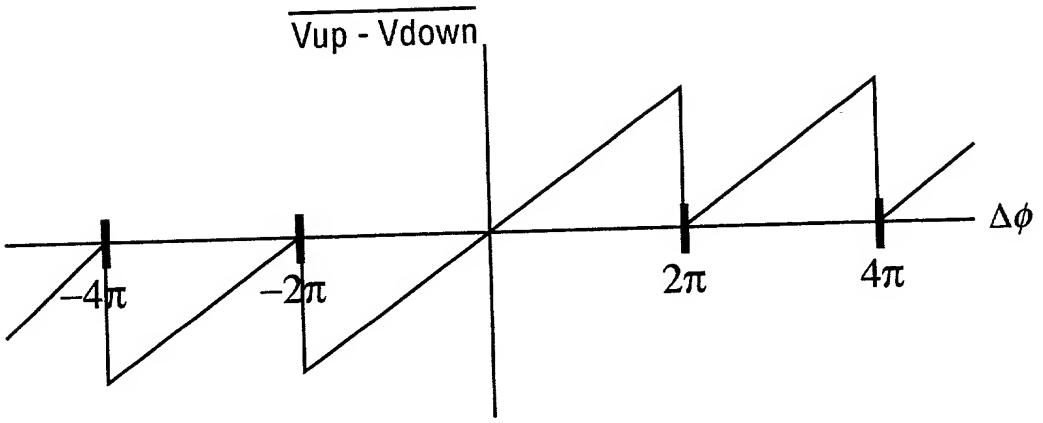
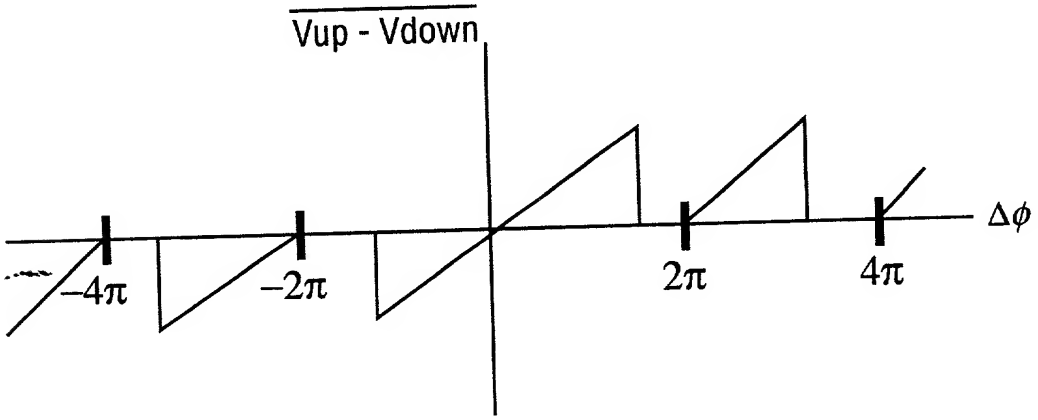

DATA/REFERENCE
Δφ
FEEDBACK
1
Vup
0
WITHOUT RESET PULSE
Vdown
0
1
Vup
0
WITH RESET PULSE
Vdown

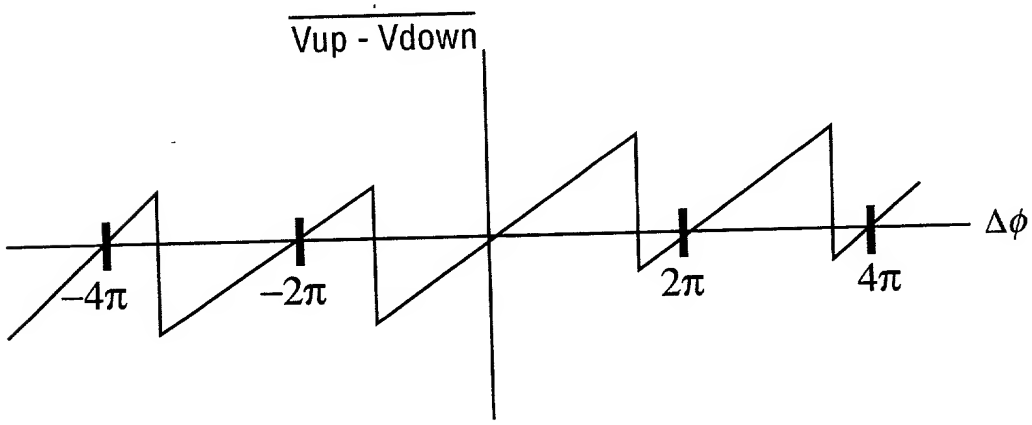
FIG. 1B



Ideal PFD



PFD with dead zone



PFD with finite pulse width

FIG. 1C

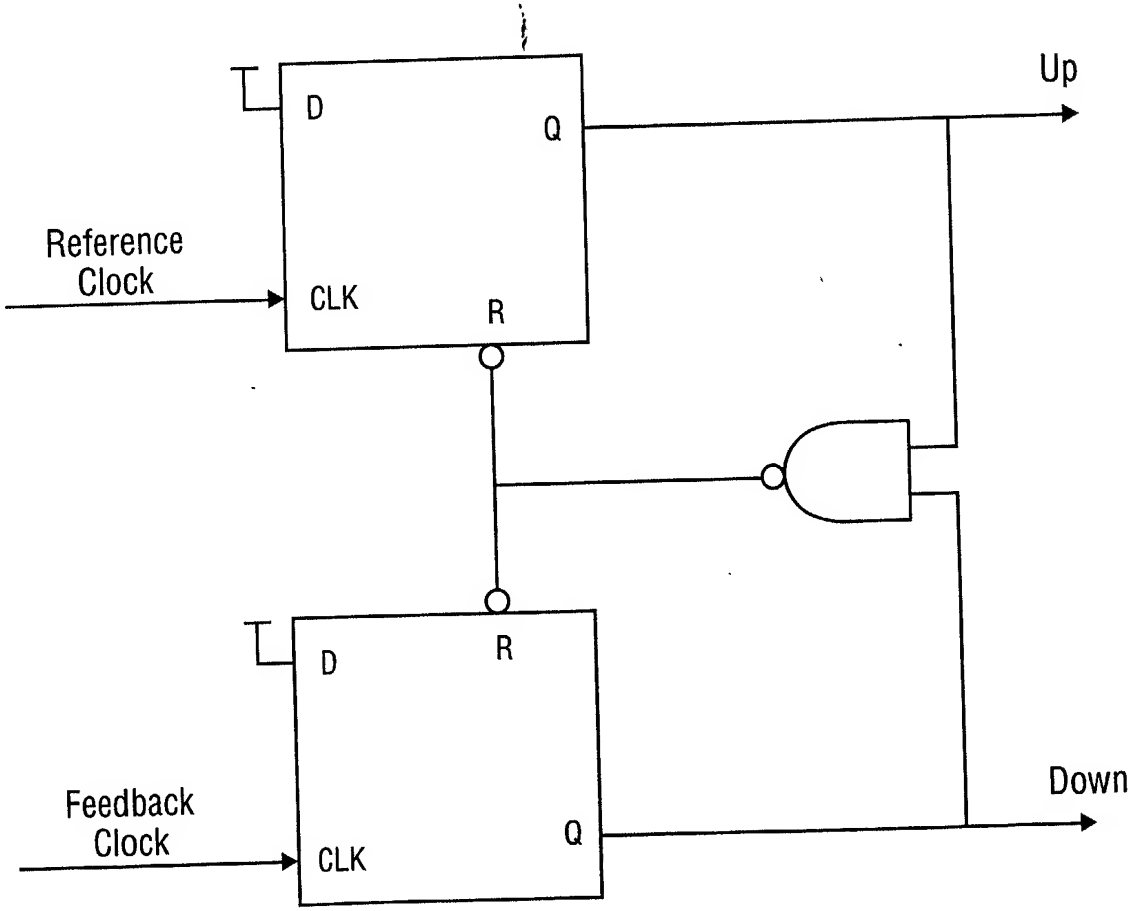


FIG. 1D

20080930 08:58:08

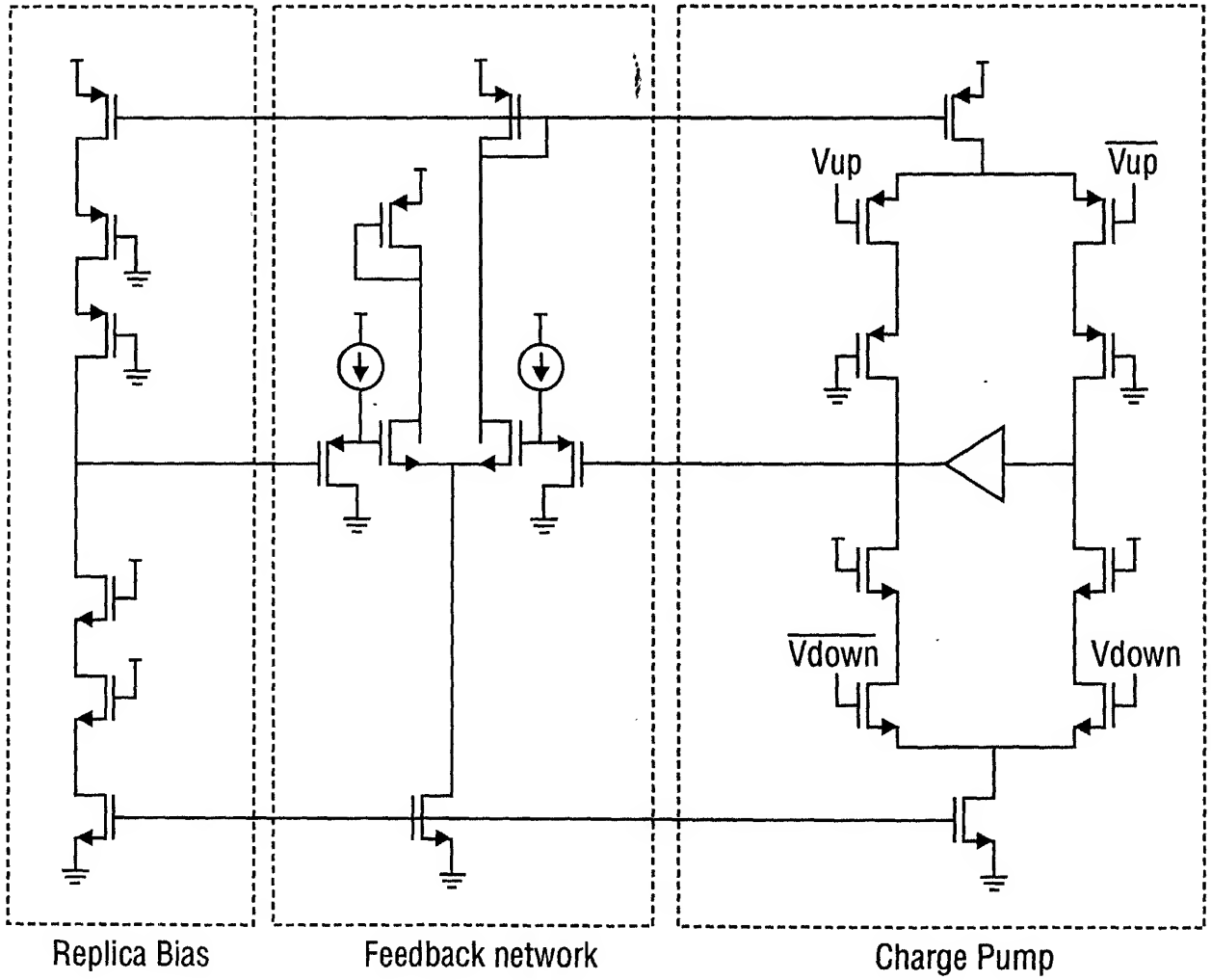


FIG. 1E

20020" 02wE501

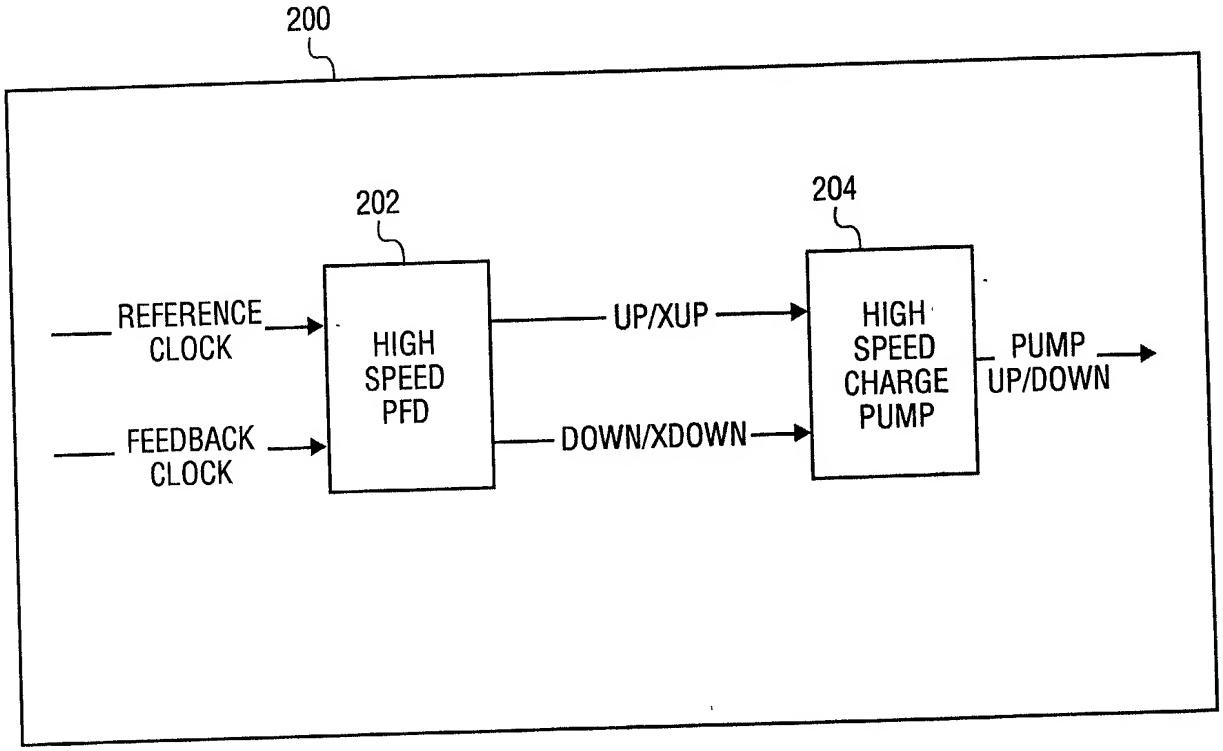


FIG. 2

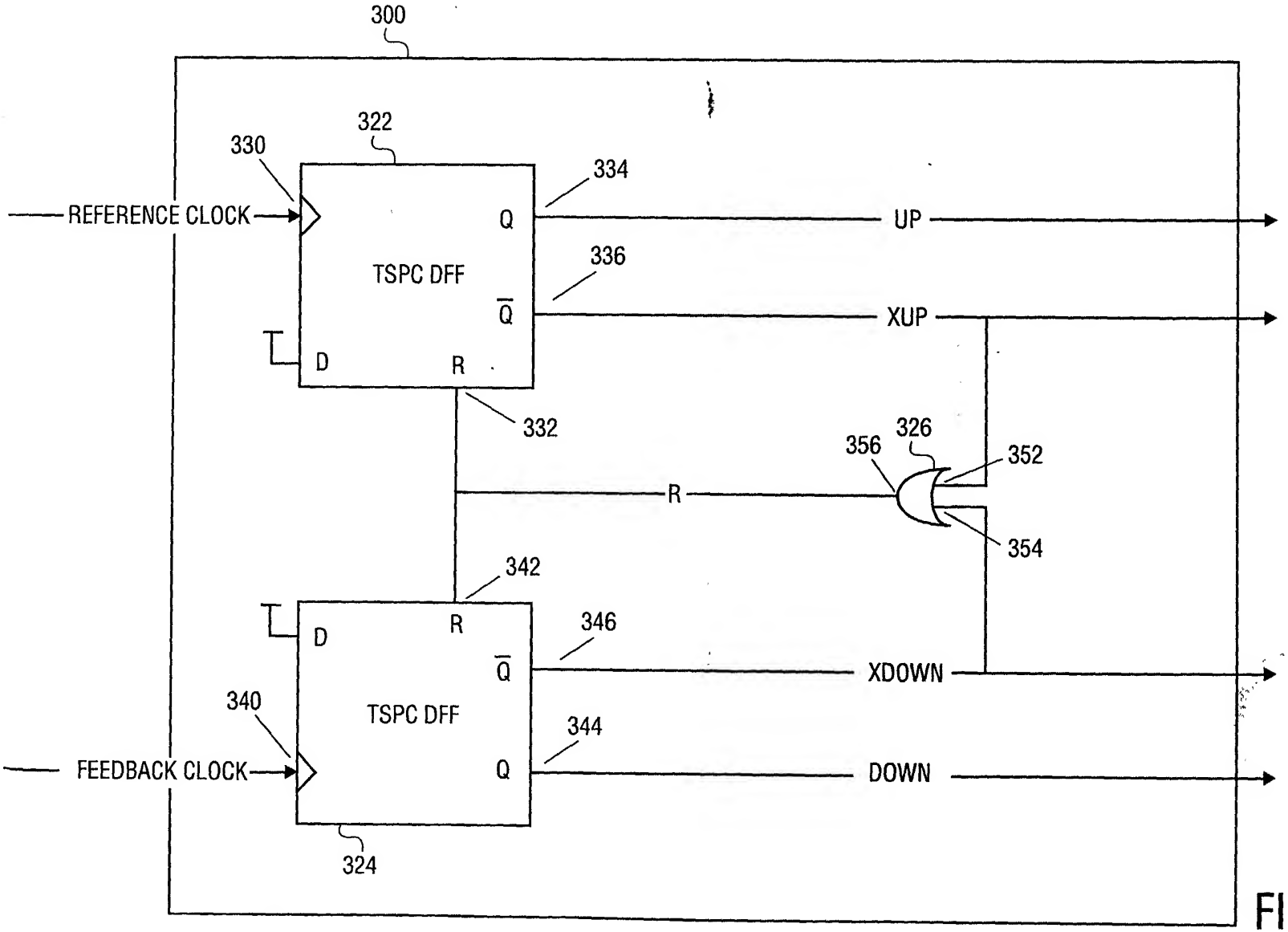

300
322
330
334
REFERENCE CLOCK
Q
UP
TSPC DFF
336
$\overline{Q}$
XUP
D
R
332
326
356
352
R
354
342
D
R
346
$\overline{Q}$
XDOWN
340
TSPC DFF
344
FEEDBACK CLOCK
Q
DOWN
324

FIG. 3

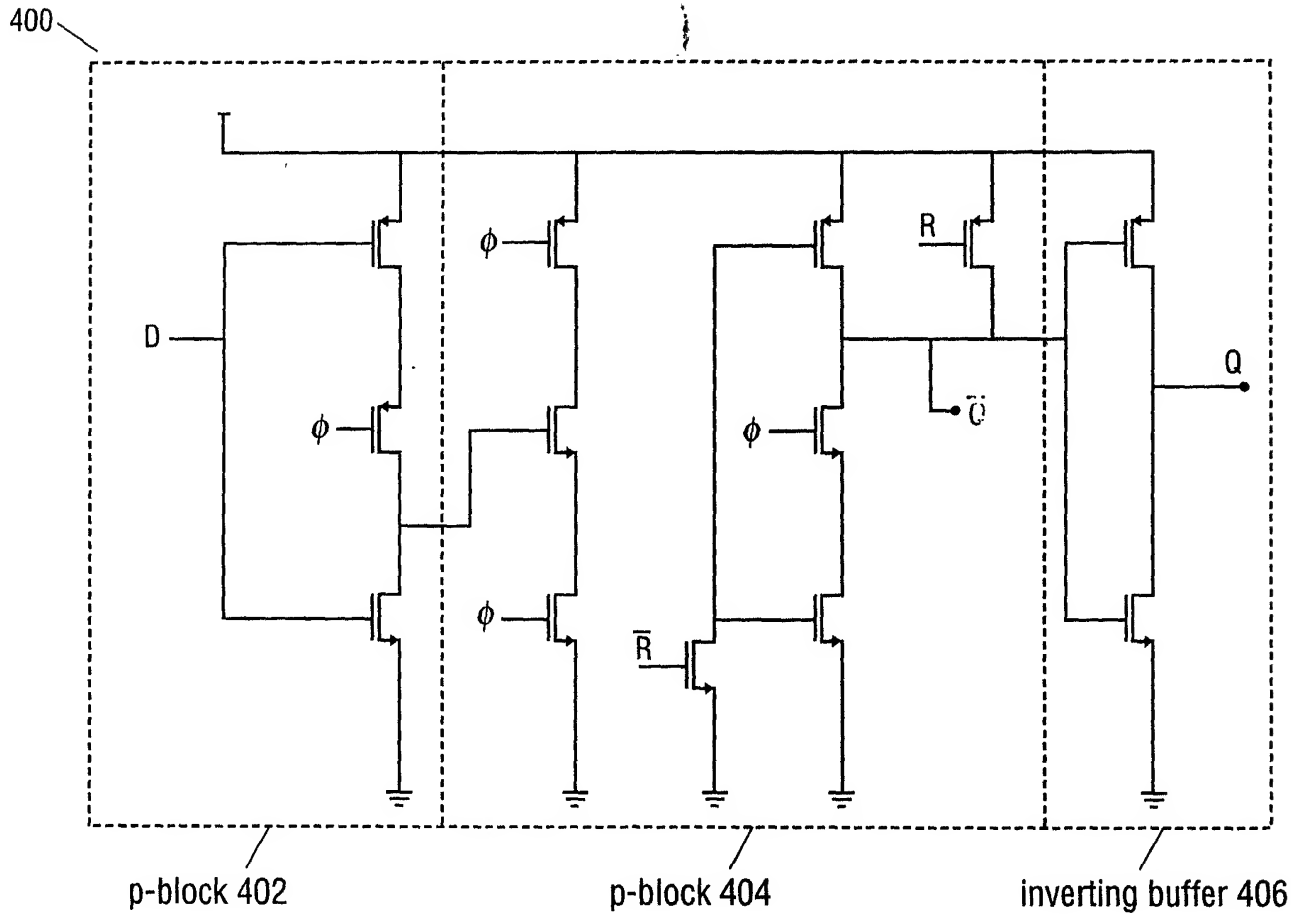

400
D
ϕ
ϕ
ϕ
ϕ
R
$\bar{R}$
$\bar{Q}$
Q
p-block 402
p-block 404
inverting buffer 406

FIG. 4

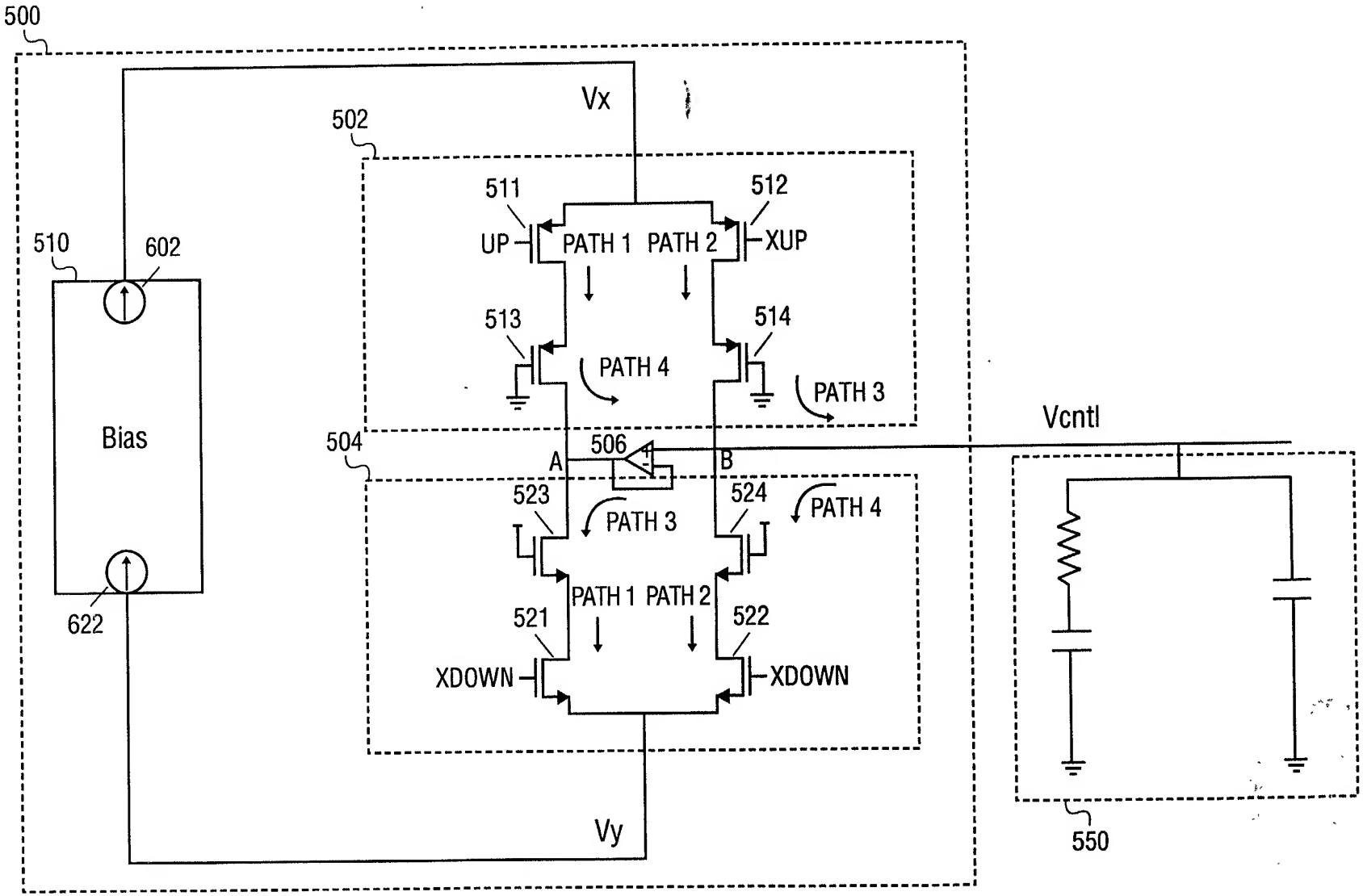

500
Vx
502
511
512
UP
PATH 1
PATH 2
XUP
510
602
513
514
PATH 4
PATH 3
Bias
Vcntl
504
506
A
B
523
524
PATH 4
PATH 3
PATH 1
PATH 2
521
522
XDOWN
XDOWN
622
Vy
550

FIG. 5

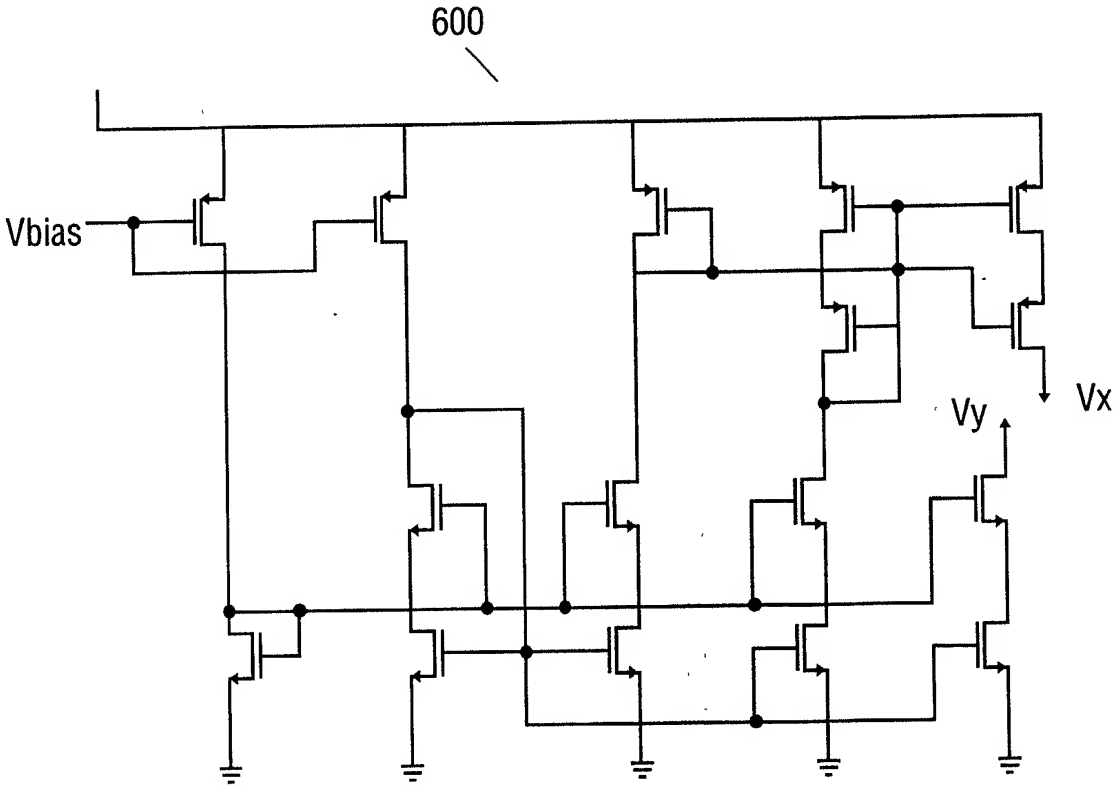


FIG. 6

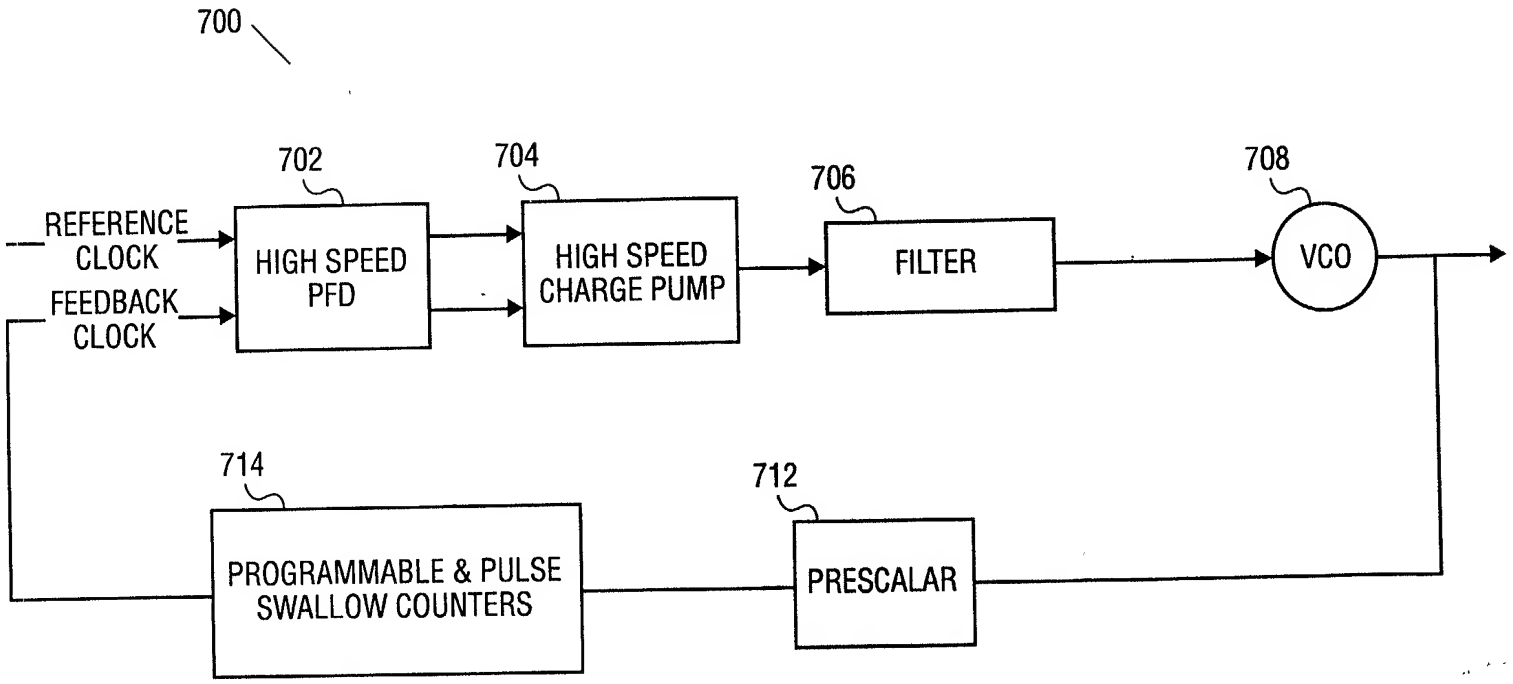

700
702
704
706
708
REFERENCE CLOCK
FEEDBACK CLOCK
HIGH SPEED PFD
HIGH SPEED CHARGE PUMP
FILTER
VCO
714
712
PROGRAMMABLE & PULSE SWALLOW COUNTERS
PRESCALAR

FIG. 7